

# Work Order ID 75130

**\*75130\***

Page 1

October-17-11 3:43:08 PM

Item ID: D212-664-107TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: Stop **\*NS2\***  
 Item Name: Crosstube Turning Detail  
 Start Date: 17/10/2011 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 04/11/2011 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: M.C.J Date: 11/10/17 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D212-664-147	Rev B

100  
**\*100\***  
 Mori Seiki  
 Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo  
 1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA705  
 2-Turn first side as per Folio FA113  
 3-Blend transition lines only, \*\*do not sand whole tube\*\*:  
 FOLIO REV: 11  
 DWG REV: 13  
 \*Use mill bastard file, brush file repeatedly with file card.  
 \*Do not use sandpaper coarser than 320 grit.

0.00  
 0.00

DF 11/10/18 1 Ø

110  
**\*110\***  
 QC  
 Quality Control

QC1- Inspect dimensions to dimension sheet

Memo

0.00  
 0.00

DF 11/10/18 1 Ø

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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120

MORI SEIKI CNC LATHE LARGE

0.00

0.00

Mori Seiki

## Mori Seiki CNC Lathe Large

## Memo

1-Turn second side as per Folio FA705

2-Blend transition lines only, \*\*do not sand whole tube\*\*:

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

FOLIO REV: AA

DWG REV: 13

### 3- Remove plugs and sand

130

QC1- Inspect dimensions to dimension sheet

0.00

0.00

QC

### Quality Control

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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October-17-11 3:43:08 PM

**\*75130\***

Page 3

**Accept**

**\*N900040100\***

Setup Start \*NS1\*

Stop \*NS2\*

**Item Name:** Crosstube Turning Detail

**Start Date:** 17/10/2011      **Start Qty:** 1.00

**\* 1 \***

**Cust Item ID:**

**Required Date:** 04/11/2011      **Req'd Qty:** 1.00

**\* 1 \***

**Customer:**

**Reference:**

**Approvals:**      **Process Plan:** \_\_\_\_\_      **Date:** \_\_\_\_\_      **Tooling:** \_\_\_\_\_      **Date:** \_\_\_\_\_

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

**Insp.  
Stamp**

140

QC8- Inspect parts - second check

0.00

**\*140\***

QC

## Memo

0.00

## Quality Control

145

0.00

**\*145\***

## Crosstubes

## Memo

0.00

## Crosstubes

GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

150

### Crosstubes Chemical Conversion

0.00

**\*150\***

HandFXtube

## Memo

0.00

### Hand Finishing Crosstubes

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

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**\*75130\***

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Item ID: D212-664-107TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 17/10/2011 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 04/11/2011 Req'd Qty: 1.00

**\*1\***

Customer:


Reference:

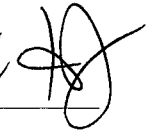
Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160	QC3- Inspect Part Finish	0.00			11-10-20				
<b>*160*</b>									
QC	Memo	0.00							
Quality Control									
170	Packaging	0.00							
<b>*170*</b>									
Packaging	Memo	0.00	JW		11-10-20				
Packaging	Identify and stock in kanban rack								
	Location: LG								
180	QC21- Final Inspection - Work Order Release	0.00							
<b>*180*</b>									
QC	Memo	0.00							
Quality Control									

11/10/20   
 11-10-20  
 (1)

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries



# Picklist Print

October-17-11 3:43:13 PM

Page 1

Work Order ID: 75130

\*75130\*

Parent Item: D212-664-107TRN

\*D212-664-107TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 17/10/2011

Required Date: 04/11/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD Verified by:ec  
IPP Rev B Removed polish 08.04.02 EC verified: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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D6019-128		Manufactured	No			110	Each	2.0000	1	1			
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\*D6019-128\*

\*\*

Crosstube Material

Location

Loc Qty

Loc Code

LG

2

32310

1

50893

1

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
1

DFG 11/10/18

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 75130
<b>Description:</b> Crosstube Assembly (205/212/412 Low Fwd)	<b>Part Number:</b> D212-664-147
<b>Inspection Dwg:</b> D212-664-147 Rev: B	<b>Page 1 of 1</b>

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.313	+/-0.010	0.314"	✓	vern	CNC-OK
	2.360	+0.005/-0.000	2.362"	✓	"	
	2.360	+0.005/-0.000	2.363"	✓	"	
	2.366	+0.005/-0.000	2.368"	✓	"	
	2.473	+0.005/-0.000	2.478"	✓	"	
	2.573	+0.005/-0.000	2.574"	✓	"	
	2.673	+0.005/-0.000	2.677"	✓	"	
	2.750	+0.005/-0.000	2.752"	✓	"	
	2.750	+0.005/-0.000	2.750"	✓	"	
SIDE B	0.313	+/-0.010	0.313"	✓	vern	CNC-OK
	2.360	+0.005/-0.000	2.363"	✓	"	
	2.360	+0.005/-0.000	2.363"	✓	"	
	2.366	+0.005/-0.000	2.367"	✓	"	
	2.473	+0.005/-0.000	2.478"	✓	"	
	2.573	+0.005/-0.000	2.574"	✓	"	
	2.673	+0.005/-0.000	2.677"	✓	"	
	2.750	+0.005/-0.000	2.752"	✓	"	
	2.750	+0.005/-0.000				
	0.126.528	+/-0.020	126.548"	✓		

<b>Measured by:</b> JFS/gmm	<b>Audited by:</b> [Signature]	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 11/10/18	<b>Date:</b> 11-10-20	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	08.11.07	New Issue (P/O D212-664-107)	KJ/EC	
B	10.02.02	Dimension 126.528 was 126.53	KJ	

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

Item	Qty -147	Qty -147B	Part Number	Description
1	X		D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
2		X	D212-664-147B	CROSSTUBE ASSEMBLY (214 LOW FWD)
3	1	1	D6019-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	2	2	D3659-1	CUFF
7	4	4	MS21920-25	CLAMP (OR MS21920-26)
8	44	44	CR3212-4-06	RIVET (OR M7885/3-4-06)
9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
10	A/R	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

#### GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6019-128  
FINISHED LENGTH = 126.528±0.020 (BEFORE BENDING/TRIMMING)
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF  
USING VIBRATING STYLUS.
- WEIGHT: D212-664-147 = 24.2 lbs (PER IIN-D212-664)  
D212-664-147B = 24.2 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD  
BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6%  
BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF  
D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER  
INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1  
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE  
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS.  
DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE  
UNACCEPTABLE.
- TORQUE CLAMPS 80 TO 100 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS  
NOT BOTTOMED-OUT AFTER TORQUING.
- INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF  
SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE.  
SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER

NO 75130 M.C.J  
11/10/17

DEO ATTACHED

Per EOW #1164  
11.07.20  
UNDER REVIEW  
11/10/17

RELEASED  
R 2009-10-29

B	REVISE GENERAL NOTES/PART LIST; UPDATE TO CURRENT STANDARDS; ADD -147B (ZN C4-2, D4-2)	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN	9P	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9P	DRAWING NO.	REV. B
MFG. APPR.	10	D212-664-147	SHEET 1 OF 4
APPROVED	10	TITLE	SCALE
DE APPR.	10	CROSSTUBE (205/212/412 LOW FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

**Dart Aerospace Ltd**

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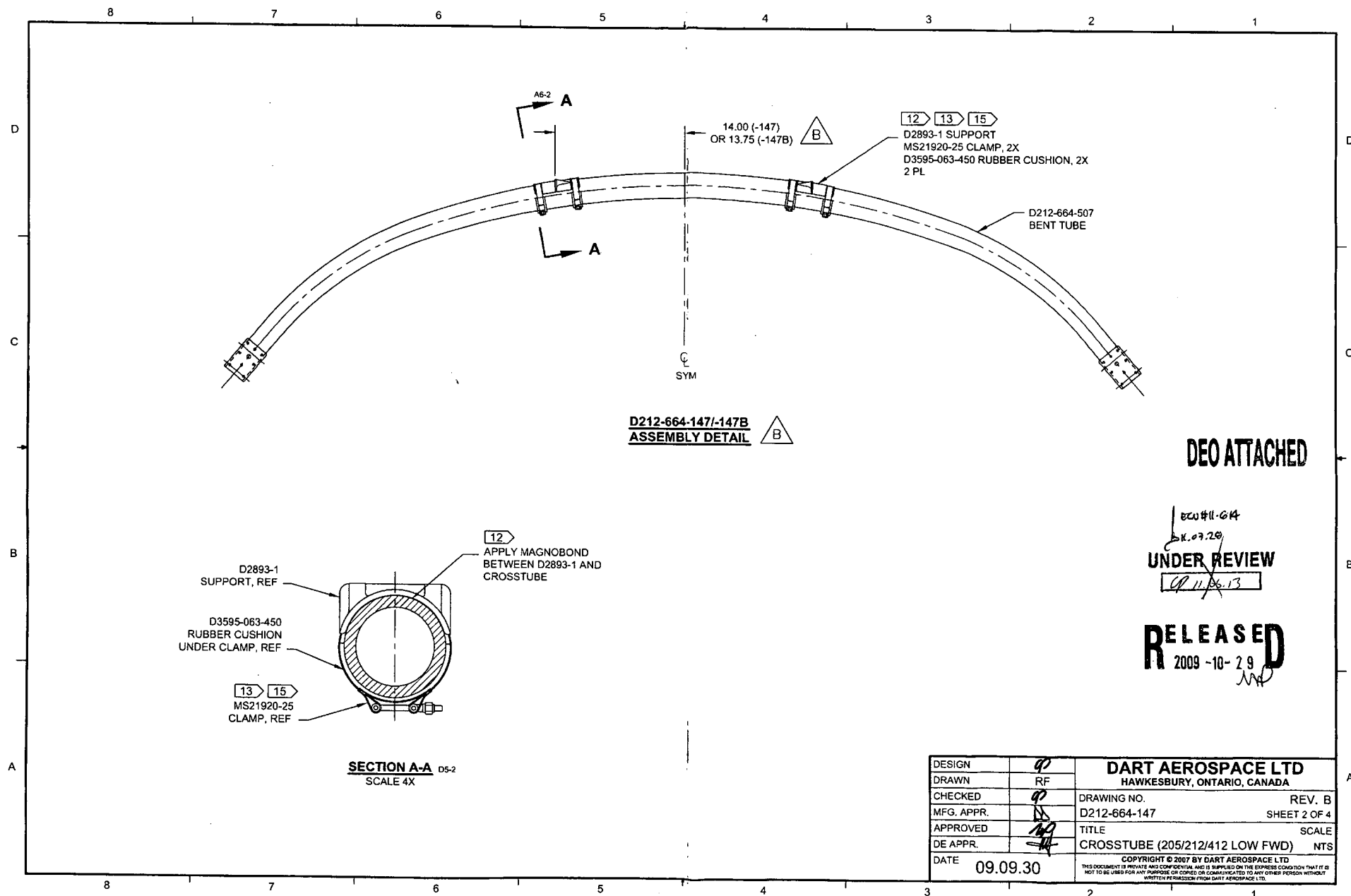
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

75130



DEO ATTACHED

ECU #11-614  
K.07.20  
UNDER REVIEW  
09.11.13

RELEASED  
2009-10-29

DESIGN	q	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	q	DRAWING NO.	REV. B
MFG. APPR.	q	D212-664-147	SHEET 2 OF 4
APPROVED	q	TITLE	SCALE
DE APPR.	q	CROSSTUBE (205/212/412 LOW FWD)	NT
DATE	09.09.30	COPYRIGHT © 2007 BY DART AEROSPACE LTD	
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			

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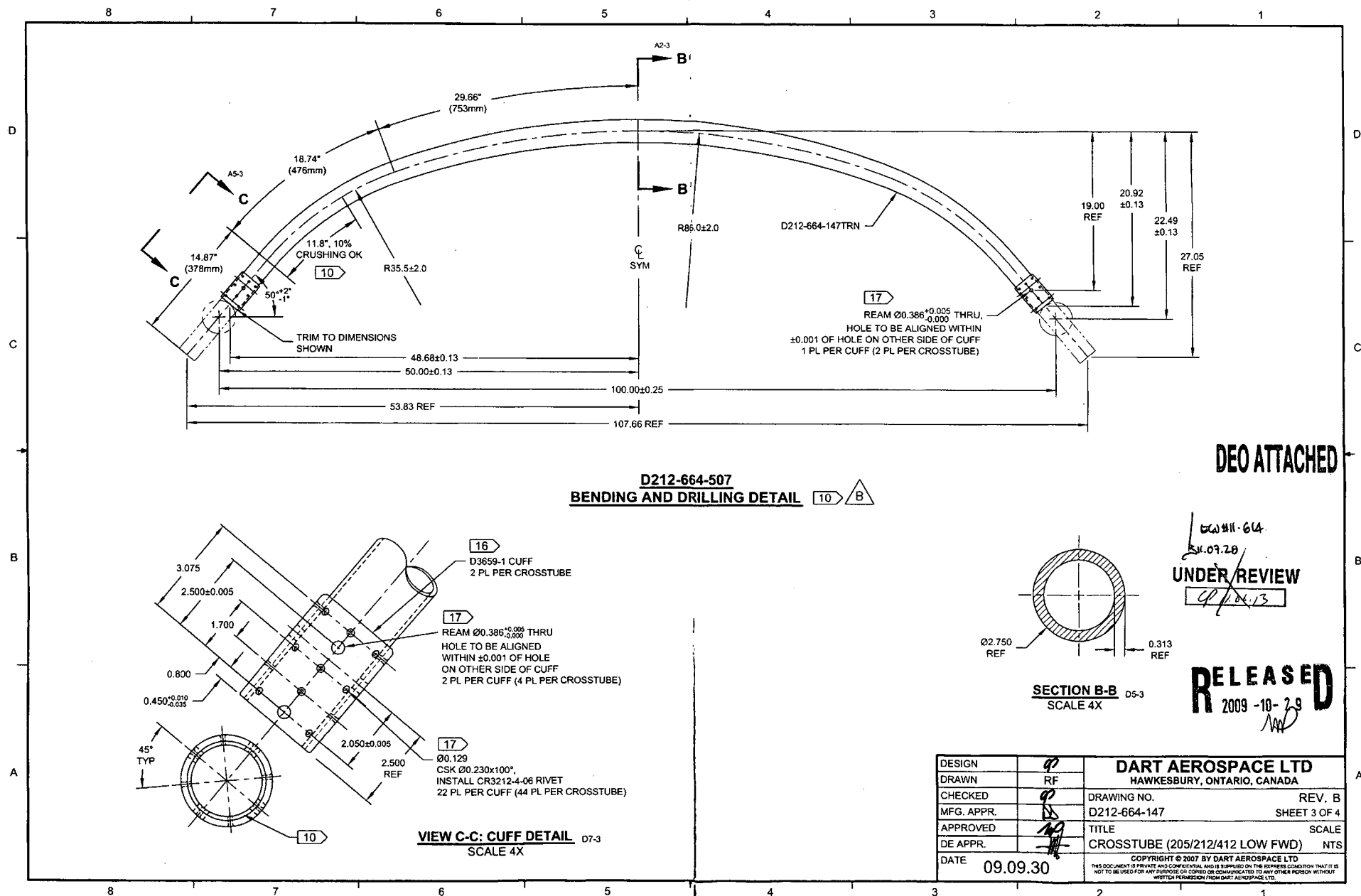
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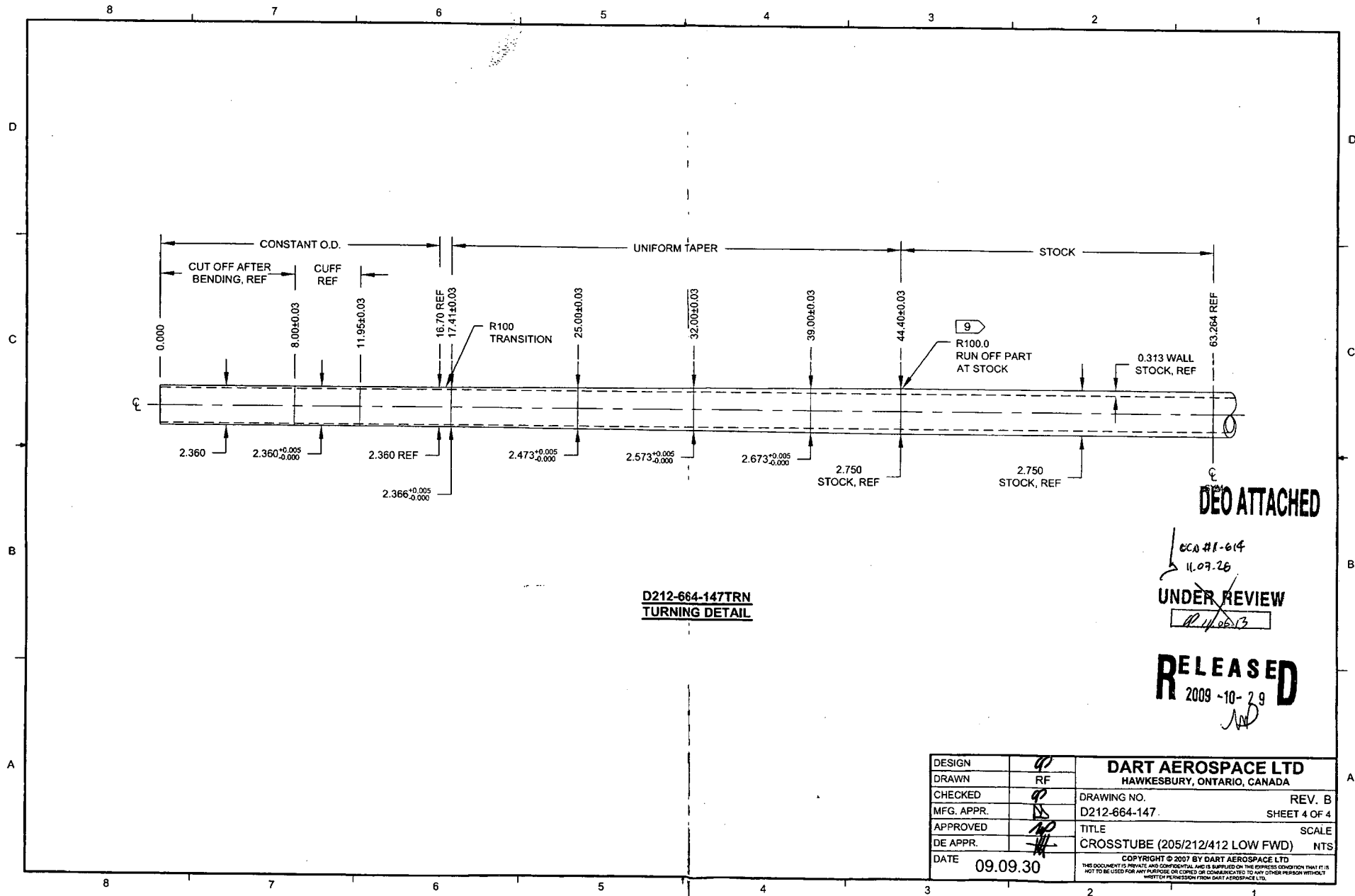
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DEO ATTACHED

ECO #1-614  
11.07.26

UNDER REVIEW

RELEASED  
2009-10-29

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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75130

DRAWING NO. D212-664-147	TITLE CROSSTUBE ASS'Y (205 LOW FWD)	REV. B	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>		D.E.O. NO. D212-664-147-B-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>qp</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>188</i>	APPROVED <i>W.P.</i>		DE APPR. <i>W.P.</i>		
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/24		DATE 11.07.21		

**PURPOSE:**  
REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

IS:

Item	Qty -147	Qty -147B	Part Number	Description
9	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
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NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2893-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
*W.P.*

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries